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ABSTRACT

The possibility that direct participation by faculty in projects to revise curricula and create new instructional media would also generate a more systematic way of thinking about teaching was studied through administration of a questionnaire to faculty at Illinois State University who had received an instructional development program grant. Of the 342 distributed questionnaires, 190 usable responses were obtained. Results suggest that the artist-scientist concept of teaching is not a single dimension: faculty who may have a more theory-based orientation to teaching (as opposed to experience-based) will not necessarily have a more public-based orientation or embrace the notion of standardization. Data are presented on: the results of a factor analysis of three teaching orientations; information on the projects that were undertaken; and results and reactions to the projects. Reevaluation of the role of faculty in the planning and production phases of project design is suggested. (SW)

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THE LATENT FUNCTIONS OF TEACHER-IMPROVEMENT PROGRAMS IN HIGHER EDUCATION*

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With the profusion of new programs created in the 1970's to improve the quality of teaching in higher education, there seems to be an increasing level of interest in the evaluation of such efforts as witnessed by the recent publication on this subject by Change Magazine: "Evaluating Teaching Improvement Programs" (O'Connell, W. R. Jr. and Meeth, R. R., 1978). In brief, this little monograph provides a down-to-earth rationale and suggests a number of practical criteria that may be used in evaluating teaching improvement programs. Of particular importance for us is the call by the authors for finding better ways of relating teaching improvement programs to changes in teaching practices and better experiences for students. Their emphasis, as it should be, is on the quality and quantity of student learning; however, O'Connell and Meeth also acknowledge the importance of assessing the effects that such programs have on the faculty regardless of their impact on the students: "But even if students learn more than they used to, there are still other parts to the larger whole. Improved teaching means that the instructional process is less ambivalent, more pointed, more efficient." (p. 11).

An Instructional Development Program was started at Illinois State University in 1972. Since then, more than 400 projects designed to change the form and content of instruction have been completed by individual and small groups of faculty. New courses have been designed, existing courses and programs have been altered, computer assisted instruction programs have been created, and a variety of new instructional materials have been designed. Clearly, the introduction of new instructional materials and curriculum revisions has altered appreciably the nature of teaching in many classrooms; however, it is not as apparent whether or not the process of creating such changes also has affected the way participating faculty think about teaching that would make the instructional process less ambivalent, more pointed, and more efficient. The purpose of this paper is to report the results of our attempt to evaluate this possibility.

Perspective

Various approaches have been created to improve teaching in higher education during the last decade. Instructional development programs are intended to focus primarily on the conditions of learning such as the revision of curricula or media, whereas, programs for faculty development are expected to enhance the talents, expand the interests, improve the competence and generally affect

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the professional and personal growth of the faculty as instructors. Each approach purportedly has different objectives and stresses different kinds of activities although there may be considerable overlap between the two (Gaff, 1975).

For several years these distinctions at Illinois State seemed eminently reasonable--even convincing; however, several pieces of information suggest the overlap may be greater than the differences. First, a number of faculty, who have been involved in the Instructional Development Program, have observed that the work on the revision of curricula or media has become the occasion to consider seriously how and why their teaching works or doesn't work--something that faculty development programs are expected to do. Apparently, the activity itself raises certain personal and professional questions that are not answered by the completion of the project. A second and more systematic line of evidence was suggested by the data from another investigation on the formal and informal rewards that accrued to the faculty as a result of participation in the Instructional Development Program at Illinois State (Jabker and Halinski, 1978). In this study, we found that almost 85 percent of the faculty reported an increased effectiveness as a teacher as a result of their efforts to improve instruction. While it could be claimed that the perceived increase in effectiveness is due primarily to the introduction of new materials, it also seems reasonable to speculate that this information complements the anecdotal data about changes in ideas. We were sufficiently impressed with these data that we decided to see if this phenomenon were common to all participants in the Instructional Development Program. If significant changes in the personal and professional growth of faculty occurred as a result of instructional development activities only, then it may suggest a serious reexamination of the typical structure of teacher improvement programs--an issue of some importance for many institutions. As a result, this study is based on an assumption that some of the experiences occurring before, during, and after involvement in a project to improve instruction produce unanticipated effects on the way that the faculty think about teaching that, in turn, may affect the efficiency of instruction and changes in teaching practices. We have borrowed a phrase from Merton (1957) that designates such unanticipated events as latent functions.

It is commonly accepted that very few faculty who teach in universities and colleges have been prepared to do so through formal instruction or training. Most of their academic work is devoted primarily to learning the subject matter of their discipline, and teaching skills are acquired informally through some process like role modeling or through apprenticeships as graduate assistants. Subsequent refinement of these skills is largely through trial-and-error and experience. In this sense, teaching is an art (Axelrod, 1973; Eble, 1976; Highet, 1950) rather than a science for most faculty. Horne (1917) in what appears to be one of the earlier but little known contemporary treatises on the subject, characterized teaching as an art in the following way:

> "The teacher is like the artist, the pupils are his material through whom he is expressing his ideals. Such an artist-teacher is spontaneous and free in his methods, knowing the

> rules of the technique of teaching but subordinating them to his own purposes. He is self-expressive in letting his pupils fully into the secrets of his ambition for them as individuals and in showing the ideals regnant in his own life. He is imaginative in handling the familiar material of instruction in new and unfamiliar ways, making contrasts and suggesting comparisons. He is imitative of the great masters of teaching, Socrates, Jesus, Pestolozzi, and Froebel, but in his own independent way. He is animated by the love of teaching, by the love of his pupils, and by the joy he finds in making ideals take root in human lives. And at the end of each day's work, each week's, each year's, there is the sense of having emptied himself, the demand for quiet and rest till the burden of fullness is again present." (pp 22-23).

We have taken the liberty of quoting this somewhat romantic citation at such length to illustrate some of the central characteristics of artistic activity: spontaneity, self-expression, imagination, imitation, love, and self-relief. Characteristics that we believe are important in good teaching, but not conducive to the systematic improvement of teaching.

Unfortunately we were unable to locate a similar passage to summarize the characteristics of the teacher as scientist; however, it seems that those who describe or advocate the art of teaching characterize the science of teaching in polar opposites. Horne, for example, also said that "in contrast with science, which is knowledge, art is an action. In science, the intellect is primarily involved; in art, the will. In science, truth is our goal; in art, performance of some kind." (p. 5). While it is difficult to believe after reading Skinner and Watson's personal description of their work (Skinner, 1959; Watson, 1968) that the activities of the scientist are totally devoid of spontaneity, self-expression, imagination, imitation, love, and self-relief, and even humor or jealousy, we believe there are substantial differences between the teacher as artist and the teacher as scientist that are important to the improvement of teaching in higher education. More to the point, we believe, with Gage (1972) that the methods of science must be applied to teaching as they have been elsewhere if the quality of instruction in universities and colleges will ever reach a level of improvement that is expected from programs designed to achieve this elusive goal

> "Although teaching requires artistry, it can be subjected to scientific scrutiny. The power to explain, predict, and control that may result from such scrutiny will not dehumanize teaching. Just as engineers can still erercise ingenuity within the theory of thermodynamics, teachers will still have room for artistic variation on the theory that scientific study of teaching may establish ... Theories of teaching are desirable for their practical value if any is forthcoming, of course, but they are desirable in any case." (p. 58).

From our perspective, then, we are claiming that programs for the improvement of teaching in higher education should be characterized by a greater emphasis on the science of teaching without losing the humanistic values of the art of teaching. Specifically, there should be an increase in efforts to validate the context, procedures, and effectiveness of teaching. To do this, teaching will need to become more public, more unemotional or detached, show a greater dedication to the achievement of specific goals, increase the level of standardization of procedures, and rely more heavily on data, research and theory.

As a result of the data we have collected and more than six years of contact with faculty who have been involved in specific projects to improve instruction, it seems that the experience of applying for the grant, the activities of the project, and the results increase the participants' scientific approaches to teaching. The experience itself seems to force the faculty member to record, verify, classify and communicate to others the results of the project. Moreover, it seems that this experience may be generalized to other aspects of teaching that were not intended originally to be affected directly by the project. If true, these scientific-type actions are consistent with Ausubel's observations (1963) about one of the values of discovery learning: "...when the learning task is...difficult and unfamiliar, autonomous discovery probably enhances intuitive meaningfulness by intensifying and personalizing both the concreteness of experience and the actual operations of abstracting and generalizing from empirical data." (p. 143). Although it is premature to propose formal hypotheses to be tested on the basis of these observations; we have attempted to determine (1) if the Instructional Development Program project activities have altered the participants' concepts about teaching; and (2) the extent to which the project has affected the quality of instructio beyond the project.

Method and Data Sources

The procedures for awarding the Instructional Development Program grants have not changed substantially since the inception of the program in 1972. In brief, the steps include an announcement to the faculty regarding the availability of funds for the following year, applications, review of the applications by a faculty committee, and, finally, awards to the successful applicants. Once the awards have been allocated, the project may be started at any time to be completed by the end of the fiscal year. In other words, each IDP project has a financial life-span of one year whether or not the activities have been completed.

Since we have assumed that the project activities are intimately related to increases in scientific thinking about teaching, we have assumed also that such changes would correlate positively with the length of time since the project has been completed. That is, the scientific thinking of faculty who have completed projects several years ago should be greater than those persons who are in the process of completing the project currently. To measure this possibility, a questionnaire was constructed to obtain selected items of personnel information, an assessment of the fate and value of the respondents' first instructional development projects, and reactions to 79 statements that were designed to elicit artistic or scientific ways of thinking about teaching. The responses were to be anonymous.

We created the artistic-scientific items as follows. First, significant proponents of the "teaching is an art" position were read carefully to determine the central and common characteristics of an artistic or aesthetic activity. Then, for each artistic characteristic, a scientific counterpart was devised. Next, definitions were written, and when such definitions did not suggest adequate independence of the concepts, adjustments were made to achieve concepts that were reasonable sets of descriptors and were functionally independent. The final list included four pairs of concepts that were intended to distinguish between artistic and scientific approaches: (1) private vs. public; (2) involvement vs. detachment; (3) idiosyncratic vs. standardized, and (4) experience vs. theory. These concepts were used as one axis of a two-dimensional matrix for the creation of the questionnaire items.

The second axis of the matrix was composed of a series of eighteen teaching tasks selected from Ausubel (1963), such as, "generate interest in subject matter," "inspire commitment to learning," "pace instruction," "integrate current and past learning," "arrange practice schedules and review periods," "provide rewards," and the like. One or more items were written for each task and each artistic-scientific concept so that a pool of approximately 200 items was generated.

Several colleagues and graduate students who had not been aware of what we were doing, agreed to test independently the items against the matrix. Their success in this effort was used as an index of content validity. New items were written for empty cells, and the validation process was repeated. The group of 79 items was selected finally although we had some reservation about the effects that a questionnaire of this length would have on the return rate, reliability, and validity. Seventeen additional questions were developed that dealt with the fate of the first project and its impact.

The 99 item questionnaire and an op-scan answer form were sent to each person at Illinois State who had received an Instructional Development Grant since 1972--a total of 342 persons. Those who had not received a grant were excluded inasmuch as we were interested only in the potential effect that the Instructional Development Program may have had on the participants. Two weeks after the first mailing, a reminder was sent to all potential respondents.

Results

Return Rate. One hundred ninety usable questionnaires of the 342 distributed were returned for a rate of 56 percent.

Characteristics of the Respondents. The majority of the respondents could be considered senior faculty. Seventy-four percent are tenured and 78 percent have seven or more years of teaching experience in higher education. By contrast, the distribution among ranks is more equal: professors, 36 percent; associate professors, 31 percent; assistant professors, 28 percent; and other ranks, 5 percent.

Artistic-Scientific Perceptions of Teaching. The 79 items designed to identify SPSS procedure, FACTOR (N=190). The main diagonal elements of the correlation matrix were replaced with initial communality estimates being the squared multiple correlation between a given variable and the remainder of the variables in the matrix. Three subscales were created based on the results of the varimax rotation of 5 factors and on the coefficient alpha reliabilities calculated by the SPSS procedure, RELIABILITIES. Examples of items along with the range of factor loadings for all items and the scale reliabilities are given in Table 1. The reliabilities, as shown were sufficient to enable group comparisons on each of the three scales. The scales themselves were relatively independent; the intercorrelations ranged from .00 to .26 with the median correlation being .05.

With each of the constructs identified by the three scales serving as dependent variables, regression models were tested to determine whether relationships existed between each of these variables and years since the funding of the first IDP project. With higher scores reflecting more scientific teaching styles, it was hypothesized that, given the control variables in the model--rank, tenure status and years of teaching experience in higher education, the regression weight associated with years since the first project was funded (YRS) would be positive. For each of the three constructs, the evidence did not support the hypothesis--in no case was the regression weight associated with YRS statistically significant ($p = .05$). In fact, R^2 for the full models (control variables plus YRS) did not exceed .07 for any of the three criterion variables.

Fate and Value of the Respondents First Instructional Development Project. The last 17 items on the questionnaire asked each of the respondents to report on the status and effects of their first Instructional Development Program project. We have used these responses to summarize the manifest functions of the projects to improve instruction. The data are presented in Tables 2 - 13 without comment.

TABLE I
FACTOR ANALYSIS OF ARTISTIC-SCIENTIFIC
CONCEPTIONS OF TEACHING RESPONSES

Factors	Illustrative Items	Range of Absolute Values of Factor Loadings	Scale Reliability[1]
1. Theory Orientation (19 items)	There is valid evidence that indicates what is an appropriate sequence of questions and discourse in instruction (loading; .61) There are reliable and valid rules of creating greater student interest in a course or subject matter (loading; .59) Studies in the field of communication should provide a solid basis for the best methods of confirming, clarifying, and correction student work (loading; .59)	.31 to .61	.86
2. Public Orientation (18 items)	Because there are so many events that affect what goes on in the classroom, no instructor should be held accountable for how well students learn (loading; -.51)	.29 to .51	.81
3. Standardization Orientation (12 items)	In addition to mastery, there are other qualities that must be considered in the evaluation of any student performance, such as intention, desire, interest, effort, ability, and preparation (loading; -.60) Flexibility in a course is more important than adherence to the achievement of predetermined objectives (loading; -.55) Rewards should be based on criteria other than performance (loading; .44)	.25 to .60	.68

1. Responses were recoded as necessary so that higher scores reflected a more scientific approach to teaching in the computation of a summated score for each scale and the corresponding reliabilities.

TABLE 2
PERIOD OF FIRST PROJECT

Project Period	Number	Percent
1972-73	40	21
1973-74	29	15
1974-75	21	11
1975-76	14	7
1976-77	32	17
1977-78	27	14
1978-79	21	11
No response	6	3

TABLE 3
TYPE OF FIRST PROJECT GRANT RECEIVED

	Number	Percent
Educational Innovation Program	18	10
Instructional Innovation Program	28	15
Regular Academic Year	31	16
Restricted IDP	34	18
Summer IDP	72	38
No response	7	4

*Educational Innovation Program and Instructional Innovation Program grants were the titles used from 1972 to 1974. Educational Innovation was used to identify major allocations, and Instructional Innovation was used for smaller grants. Regular Academic Year and Summer IDP grants refer to the periods when the funds could be used, and Restricted is used to describe a grant that is limited to $200 maximum.

TABLE 4
PRESENT STATUS OF FIRST PROJECT

	Number	Percent
Not completed yet	29	15
Being used in original form	34	18
Being used in slightly modified form	83	44
Revised substantially but still used	29	15
Completely abandoned	13	7
No response	2	1

TABLE 5
EFFECT OF FIRST PROJECT ON STUDENT ATTITUDES

	Number	Percent
No effect was intended or expected	36	19
Substantial improvement	82	43
Probably some improvement	41	22
Probably none	3	2
Some deterioration	1	1
Substantial deterioration	0	0
No response	27	14

TABLE 6
EFFECT OF FIRST PROJECT ON STUDENT ACHIEVEMENT

	Number	Percent
No effect was intended or expected	24	13
Substantial improvement	81	43
Probably some improvement	53	28
Probably none	6	3
Some deterioration	1	1
Substantial deterioration	0	0
No response	25	13

TABLE 7
IMPACT OF FIRST PROJECT ON COLLEAGUES

	Number	Percent
Several persons expressed interest in the project from the beginning	92	48
Not much interest at first, but recently several persons have asked about the project	19	10
Probably none	32	17
Some very unpleasant reactions were created	8	4
Don't know	14	7
No response	25	13

TABLE 8
IMPACT OF FIRST PROJECT ON PERSONAL THOUGHTS ABOUT TEACHING

	Number	Percent
Yes, it had a significant effect	57	30
Yes, a moderate effect	78	41
Probably not	21	11
Definitely not	11	6
No response	23	12

TABLE 9
ADOPTION OF RESULTS OF FIRST PROJECT

	Number	Percent
None	48	25
Yes, one or two colleagues from my department but no one outside the department	66	35
Yes, but no one from my department	13	7
Yes, several colleagues in my department as well as some from other departments	25	13
I think someone did, but I'm not certain	15	8
No response	23	12

TABLE 10
USE OR CITATION AT OTHER INSTITUTIONS OF RESULTS OF FIRST PROJECT

	Number	Percent
No	80	42
Yes, once or twice	52	27
Yes, three or more times	34	18
No response	24	13

TABLE 11
PERSONAL REACTIONS TO FIRST PROJECT

	Number	Percent
The beginning of a major change in my teaching	16	8
A substantial improvement in instructing was achieved	60	32
The results produced a moderate improvement	49	26
Probably a useful experience, but wouldn't want to do it again	16	8
A waste of time	0	0
No response	49	26

TABLE 12
ASSESSMENT OF SUCCESS OF FIRST PROJECT

	Number	Percent
Very successful	59	31
Above average	43	23
Acceptable	38	20
Below average	3	2
Failure	1	1
No response	46	24

TABLE 13
FORMAL PRESENTATIONS ABOUT FIRST PROJECT

	Percent Responding			
	No	Yes, once or twice	Yes, 3 or more	No Response
At department colloquia or meetings	42	29	6	24
At university workshops or meetings	59	14	2	25
At state or regional conferences	44	27	5	25
At national conferences	54	18	4	25
In newsletters or other non-juried publications	56	17	3	25
In articles in juried publications	58	14	3	25

Discussion

This study was designed to explore the possibility that direct participation by faculty in projects to revise curricula and create new instructional media would also generate a more systematic way of thinking about teaching--the latent functions of teaching improvement programs. A questionnaire that met what we felt were reasonable standards of reliability and validity was created and sent to all faculty who had received an Instructional Development Program grant to evaluate this possibility. Our results suggest the artist-scientist concept of teaching is not a single dimension. That is, faculty who may have a more theory based orientation to teaching (as opposed to experience based) will not necessarily have a more public based orientation or embrace the notion of standardization. At present, these components appear to be relatively independent. Further, regardless of the component that was examined, the data did not support the proposition that such latent functions occurred. Now, we are forced to re-examine our assumptions and speculations.

As it was noted in our introductory comments, some of the faculty who had been involved in projects to improve instruction had attributed some importance to the effect this experience had on their ideas about teaching. We accepted such statements at face value, but it is possible that such comments may have been patronizing or designed to increase the chances of future funding by capitalizing on something that the gatekeeper of future grants would want to hear. In a less skeptical vein, it is possible that we assigned more importance than was intended to the comments regardless of the motivation. Another interpretation that is consistent with the data is the possibility that the faculty who noted such effects were sincere but the questionnaire was not sensitive enough to detect the changes. And it is possible that only those who already have a reasonably well developed scientific approach to teaching are those who apply for grants to improve instruction, so that, the project activities represent only a forum to express such ideas rather than being the initial stimulus. Unfortunately, our data do not allow us to confirm or reject any of these possible alternative explanations now; however, there are several "next steps" that seem advisable.

The first work should be devoted to the refinement of the questionnaire. It is apparent that fewer items are needed, and it is equally apparent that the language of some of the items must be changed so that all faculty, despite their disciplinary heritage, understand what is meant by rewards, practice, confirmation, clarification, and other "educationist" jargon. We also need to do additional work to validate the artistic-scientific distinction we have tried to create. Then, we need to use different designs to test whether or not changes in scientific thinking do occur regardless of the nature of faculty development events. For the present, there seems to be no compelling reason to abandon the artistic-scientific conception of teaching styles although further work may suggest otherwise.

The data from the questions about the manifest functions of instructional development grants confirm, in general, our assessment that such grants

have altered appreciably the nature of classroom instruction. The responses are very much as were expected; however, there were some surprises. For example, the percentage of respondents who indicated their project was not intended to produce any effects on student attitudes or student achievement seems unusually high--19 and 13 percent respectively. It is difficult to understand how faculty can undertake a project to improve instruction in the absence of such objectives.

Further, work on a project to improve instruction has more than a passing effect on teaching. Seventy-one percent reported a moderate or significant effect on their personal thoughts about teaching. Approximately 40 percent said that the first project was the beginning of a major change or a substantial improvement in teaching. Although we do not know what such statements mean in terms of changes in scientific thinking, it does suggest that the projects not only were believed to be successful by the majority of the respondents (54%), but also had some effect beyond the project. In fact, approximately one-half of the respondents indicated that at least some of their colleagues had expressed interest in the project and had adopted the ideas of the project. While we may hope for a greater diffusion rate, in the absence of formal incentives or rewards for the improvement of teaching (Jabker and Halinski, 1978), unusually large numbers of faculty cannot be expected to show any interest in the instructional innovations of their colleagues if they were not affected directly.

As a concluding note, the results of this study may suggest a re-examination of the procedures of instructional development programs if the objectives are to include changes in the personal and professional growth of the faculty in addition to the revision of curricula and media. The program at Illinois State was designed to involve the faculty directly in both phases of project design--planning and production. At first, this was a matter of expediency inasmuch as the various special agencies of the University would have been unable to complete more than a handful of all the projects that were initiated. At the same time, it was believed seriously that direct involvement of the faculty in both phases would have other important benefits such as the subject of this study. This arrangement has not been altered nor has there been any reason to question its value until now; however, the results of this investigation suggest the possibility that some changes may be appropriate. For example, it may be better to give more emphasis and support to the faculty's contributions in the planning and design phases when a concern for theory is apt to be most salient, but assign the responsibility for production to other offices designed to provide this service. In any event, there is no compelling reason to abandon current efforts to improve instruction through the more traditional faculty development programs. If our data are accepted, then the possible overlap that we had assumed has not been verified. Instead, it seems that the manifest functions of instructional development projects are all that we can expect at this time, and faculty development programs are needed still to address directly the personal changes in the faculty.

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